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Improvements in and Relating to Wireless Communication Devices

Background of the Invention

The present invention relates to a method of transferring browser information and/or parameters between wireless communication devices in a telecommunication network, particularly although not exclusively a network supporting the Wireless Application Protocol (WAP) and also to apparatus therefor.

As is well known, Internet content and advanced data services can now be obtained by users equipped with suitably configured communication devices such as mobile radio telephones. In order to provide such services to wireless communication devices such as radio telephones, pagers and the like, there has been developed a de facto standard known as the Wireless Application Protocol (WAP). It allows a wireless communication device to communicate over the air with a server connected to the Internet. A Wireless Application Environment that is placed on top of the WAP stack includes a microbrowser. The browser uses wireless mark-up language (WML), a lightweight mark-up language and WMLScript, a lightweight scripting language.

WML implements a card and deck metaphor. The interaction of the browser and user is described in a set of cards that are grouped together into a document commonly referred to as a deck. The user navigates to a card in a deck reviews its content and then navigates to another card in the same deck or in a different deck. Decks of cards are transferred from origin servers as needed.

As the number and variety of content and service providers increases it is becoming increasingly apparent that there exists a need to facilitate the

dissemination of information amongst users of wireless communication devices.

Summary of the Invention

It is thus an aim of the present invention to seek to promote the dissemination of information relating to Internet content and service providers. It is a further aim of the invention to facilitate the configuration of communication devices to obtain more effectively such services.

Thus, according to one aspect of the invention, there is provided a method of transferring resource related information from a first terminal to a second terminal of a wireless communication network, wherein at least the first terminal is a client of a server connected to an external network and also to the wireless communication network which includes the terminals, comprising the steps of the first terminal negotiating a connection with the second terminal and subsequently transferring the information over the connection.

Preferably, the information facilitates access to an external network resource by the second terminal such as a URL, browser settings or the like. Alternatively, the information may have been previously downloaded from the external network and could comprise the contents of a web page. Where the user and/or the nature of the information requires it, the connection negotiated between the terminals should allow real-time transfer of that information. For example, the connection could be established as a point to point connection utilising circuit or packet switched data. In another situation, perhaps were some latency is acceptable and/or in the interests of reducing costs, a connection which does not allow real-time transfer of the information may be negotiated.

The method is particularly suitable for use under the Wireless Application Protocol (WAP). The connection may be indirect in the sense that the

information is transported over the wireless communication network for example by SMS (Short Message Service), CSD (Circuit Switched Data) or GPRS (General Packet Radio Service), or direct using Infra Red (IR), Low Power Radio Frequency (LPRF) or other suitable mechanism. Where the method is implemented under WAP, the connection whether direct or indirect will conform to the appropriate Wireless (Application Protocol) Datagram Protocol (WDP).

According to another aspect of the invention, there is provided a wireless communication terminal for use with the above described method.

Preferably, the wireless communication terminal comprises a controller arranged to receive an input of resource related information from another terminal, wherein the controller is further arranged to negotiate a connection with the other terminal and subsequently to receive the information over the connection. A terminal from which the information is transferred may operate under the Wireless Application Protocol (WAP) whereas a terminal receiving the information need not implement WAP although at the expense of reduced functionality.

In order to assist in understanding the present invention, a number of embodiments thereof will now be described by way of example and with reference to the accompanying drawings, in which:

Brief Description of the Drawings

Figure 1 schematically illustrates a wireless communication device suitable for use according to a method of the present invention;

Figure 2 shows a block diagram of the main elements of the communication device of Figure 1;

Figure 3 shows a network including the device of Figure 1;

Figure 4 is a diagram illustrative of the exchange of data between decks in accordance with the Wireless Application Protocol;

Figure 5 illustrates a user interface showing steps in the transmission of information in accordance with the present invention;

Figure 6 illustrates the message structure of a text message in accordance with the invention;

Figure 7 illustrate a user interface showing steps in the reception of information in accordance with the present invention; and

Figure 8a and 8b illustrate a variant of the user interface showing steps in the transmission and reception of setting information in accordance with the invention.

Detailed Description of the Invention

With reference to Figure 1, there is shown a wireless communication device or terminal. The terminal, which is generally designated by 1, comprises a user interface having a keypad 2, a display 3, an on/off button 4, a speaker 5, and a microphone 6. The terminal 1 is adapted for communication via a wireless telecommunication network, e.g. a cellular network. However, the terminal 1 could also have been designed for a cordless network. The keypad 2 has a first group 7 of keys as alphanumeric keys, by means of which the user can enter a telephone number, write a text message (SMS), write a name (associated with the telephone number), etc. Each of the twelve alphanumeric keys 7 is provided with a figure "0-9" or a sign "#" or "*", respectively. In alpha mode, each key is associated with a number of letters and special signs used in text editing.

The keypad 2 additionally comprises two soft keys 8, two call handling keys 9, and a navigation key 10.

The two soft keys 8 have a functionality corresponding to what is known from the terminals manufactured by Nokia under the following designations: Nokia

2110™, Nokia 8110™ and Nokia 3810™. The functionality of the soft key depends on the state of the terminal and the navigation in the menu by using a navigation key. The present functionality of the soft keys 8 is shown in separate fields in the display 3 just above the keys 8.

The two call handling keys 9 are used for establishing a call or a conference call, terminating a call or rejecting an incoming call.

The navigation key 10 is an up/down key and is placed centrally on the front surface of the terminal between the display 3 and the group of alphanumeric keys 7. Hereby the user will be able to control this key by simply pressing the up/down key using his/her thumb. Since many experienced terminal users are used to one-hand control, it is a very good solution to place an input key, requiring precise motor movements. Thus, the user may place the terminal in the hand between the fingertips and the palm of the hand, leaving the thumb free for inputting information.

Figure 2 ,schematically shows the elements of the terminal 1. The terminal 1 is adapted for use in connection with a GSM network, but, of course, the invention may also be applied in connection with other phone networks, such as other kinds of cellular networks and various forms of cordless terminal systems or in dual band terminals accessing sets of these systems/networks. The microphone 6 records the user's speech, and the analogue signals formed thereby are A/D converted in an A/D converter (not shown) before the speech is encoded in an audio part 14. The encoded speech signal is transferred to controller means 18, which may support software in the terminal. The controller means 18 also forms the interface to the peripheral units of the apparatus, including a RAM memory 17a and a Flash ROM memory 17b, a SIM card 16, the display 3 and the keypad 2 (as well as data, power supply, etc.). The controller means 18 communicates with the transmitter/receiver circuit 19. The audio part 14 speech-decodes the signal,

which is transferred from the controller 18 to the earpiece 5 via a D/A converter (not shown).

The controller means 18 is connected to the user interface. Thus, the controller means 18 monitors the activity in the terminal and controls the display 3 in response thereto.

Therefore, the controller means 18 detects the occurrence of a state change event and changes the state of the terminal and thus the display text. A state change event may be caused by the user when he activates the keypad including the navigation key 10, and these type of events are called entry events or user events. However, the network communicating with the terminal may also cause a state change event. This type of event and other events beyond the user's control are called non user events. Non user events comprise status change during call set-up, change in battery voltage, change in antenna conditions, message on reception of SMS, etc.

Figure 3 schematically shows a network 50, comprising a server computer 20 and a plurality of terminals or clients 1a, 1b and 1c. The server 20 and the clients 1 support the Wireless Application Protocol (WAP). The WAP content and its applications are specified in a set of well-known content formats based on the familiar WWW content formats. WAP is disclosed in the Wireless Application Protocol Architecture Specification; Version 30-Apr-1998; by Wireless Application Protocol Architecture Working Group.

When transporting content between the client 1 and the server 20, the content is transported using a set of standard communication protocols based on the WWW communication protocols known as the Wireless Datagram Protocol (WDP). A browser in the client 1 co-ordinates the user interface and is analogous to a standard web browser. The client 1 is provided in an environment, which makes it possible to reach a wide variety of different wireless platforms, e.g. World Wide Web (WWW). The environment provided

may be referred to as Wireless Application Environment (WAE). This means that the client 1 may be supported by some kind of browser, e.g. a micro-browser, to access the different services connected to the server 20. In order to access the services, the browser includes the following functionalities:

· Wireless Markup Language (WML) – a lightweight Markup language, similar to HTML, but optimised for use in hand-held mobile terminals;

· WML Script – a lightweight scripting language, similar to JavaScript™;

· Wireless Telephony Application (WTA, WTAI) – telephony services and programming interfaces; and

· Content Formats – a set of well-defined data formats, including images, phone book records and calendar information.

The server 20 supporting the Wireless Application Protocol is connected to a gateway 30 or in a non-illustrated variant, the gateway and server may be implemented together. The gateway 30 is also a kind of server, which identifies and encodes /decodes information between the client 1 and the server computer 20. This means that the gateway 30 is provided with encoders and decoders (not shown). In addition, the server 20 may comprise different algorithms to carry out encrypting/decrypting The encrypting/decrypting itself may be performed by well-known methods, e.g. RSA, Diffie-Hellman, etc. The server computer 20 may comprise different scripts to support WAP and data to be accessed by the client. This data may comprise all kinds of information, e.g. weather reports, news, information from stock markets, etc.

In order to access the server computer 20, from the client 1, the server 20 is connected to a wireless telecommunication network 50, e.g. a cellular telephone network. The network 50 comprises memory means (not shown), which is arranged to identify the identification means from the client 1. The memory means can be e.g. a database, comprising information about different subscribers of the network. Thus, when a client 1 tries to establish a connection to the network, the network determines if the client 1 is stored in

the memory means in which case access is allowed to the network 50. The manner by which a client 1 establishes a connection to the network 50 is well known in the art and no further description thereof is considered necessary.

Once a connection has been established to the network 50, and the client 1 is operating in the WAE then data can be transported between the client 1 and server 20 via the gateway 30 at the request of a user of the client 1. The manner in which the user interacts with the client is well known from the above WAP documentation. Thus, the interaction of the browser and user is described in a set of cards that are grouped together into a document commonly referred to as a deck. The user navigates to a card in a deck reviews its content and then navigates to another card in the same deck or in a different deck. Decks of cards are transferred from the server 20 as needed.

In more detail, and with reference to Figure 4, there is shown a Main Deck 60 comprising three cards: a Start Card 61, an Option Card 62 and an Exit Card 63. On activation of a WAP session, the Main Deck 60 is loaded into the browser and the Start Card 61 is automatically activated. The start card 61 has a first portion 61a which defines a number of parameters each of which is assigned a value reflecting the value of the parameter in a "master copy" (not shown) of the content stored in the server 20. The second portion 61b of the Start Card 61 updates the parameter values to reflect the value of the parameters stored locally in the client 1. The second portion 61b sequentially effects access to Link Decks 64 that form the second level in the hierarchy, each of which respectively effects access to a WML Deck 65 and Storage Deck 66 in a third layer of the hierarchy. Thus the second portion 61b ensures that the Link Decks 64, WML Deck 65 and Storage Deck 66 are loaded into a client cache from the server 20 if not already there. The WML Deck 65 comprises content such as an email or news piece, whilst a corresponding Storage Deck 66 contains parameters associated with the WML Deck 65 such as whether the email or news piece has been read

The Option card 62 is entered on reaching the end of the Start Card 61. The Option card 62 has a number of portions, each of which is associated with a defined one of the Link Decks 64 in the second layer of hierarchy. On entering the Option Card 62, the portions are automatically activated, sequentially creating user selectable links to the WML Deck 65 on the display of the terminal 1. Activation by the user causes the browser to access the selected WML Deck 65 in the third layer of hierarchy. The browser first tries to load the Deck 65 from the cache and if unsuccessful requests its transfer from the server 20.

The Exit Card 63 is accessed when the application entered through the Main Deck 60 is exited. The exit card 63 is used to keep the "master records" stored in the server 20 in line with the records stored and updated in the browser. The storage decks 66 each store parameters that may vary during an application session. For example the parameter indicating whether a mail or news piece has been read will change if the WML deck 65 containing the email or news is accessed also a parameter may indicate that the user has chosen to delete a news piece or email. The exit card 63 creates a message that identifies the new values of the changed parameters and sends it to the server 20.

In the event that a user (hereinafter the sender) locates resource related information such as a service or content which he believes might be of interest to another party (hereinafter the recipient) he may wish to provide the relevant information to that recipient. In the following, it is assumed that all the terminals 1 can communicate with the network 50.

Referring to Figure 5, where the sender is viewing content in the form of a WML deck 65, he can, by depressing a suitably programmed softkey 8 obtain access to a menu 70 which permits him to select the content he wishes to send, either a URL of the presently viewed Deck 65 or the Deck 65 itself. The sender is then provided with a further menu 71 from which he must choose

the bearer he wishes to use to transport the content, e.g. SMS, Infra Red (IR), Circuit Switched Data (CSD) or Low Power RF (LPRF) or General Packet Radio Service (GPRS). An Editor 72 gives the sender access to a list of names and associated addresses, be they telephone numbers or URLs, to whom the sender may wish to send the content. Alternatively, the sender may simply enter the required address directly into his terminal 1a. Once provided with an address, the sender's terminal 1a is ready to attempt to deliver the content to the recipient's terminal 1b.

However, in the particular case of transmission via Infra Red the receiving terminal does not need to be identified. By simply establishing a line of sight connection between the terminals, the content may be sent direct to the receiving terminal.

In the case where the content is a Deck 65, the sender's terminal 1a firstly attempts to establish a connection-oriented session with the recipient's terminal 1b by firstly sending a connectionless push to a registered WDP port on the terminal 1b which is processed by a Session Initiation Application (SIA) resident on the receiving terminal 1b. Clearly, if the receiving terminal 1c is not WAP enabled, it might receive this message but does not react to it. As a result, the transmitting terminal does not receive a receive acknowledgement message. Consequently, the transmitting terminal can assume after a certain time that the push was not successful. This might be indicated to the sending terminal by a time-out timer. The sender will then be provided with the option via the UI of sending the content as a text message via SMS as is set out in more detail below. However, assuming the receiving terminal 1b is WAP enabled, it is now alerted to the need to receive a WAPpush and providing the recipient has configured the terminal 1b to allow the establishment of sessions by this mechanism, a session commences. Otherwise, a message is dispatched to the sender's terminal indicating that delivery of the pushed content is not possible.

Once the session has been established, the sender's terminal 1a is able to issue a WAP push command which causes the content to be transported to the recipient's terminal 1b. The next step will depend on the capabilities of the recipient's terminal 1b. If the terminal 1b is capable of supporting multiple browsers or user agents, then the Deck 65 will be routed to a new user agent which runs in the background and which may subsequently be selected by the recipient via the UI of his terminal 1b to move the currently in use user agent to the background and to replace it in the foreground with the received Deck 65. Alternatively, where the terminal 1b can support a single browser or user agent only, the recipient will be prompted via the UI to exit the existing Deck in favour of the received Deck 65. In such circumstances where the recipient elects not to exit the existing user agent, a message will be delivered to the sender's terminal 1a indicating the rejection of the content 65. Optionally, the user might have the possibility to save the pushed message into a memory of his terminal for later use.

In the event that the receiving terminal 1c is not WAP enabled, the sender may send the content via the standard SMS route. This method may be selected by the sender initially where he knows that the recipient does not have a WAP enabled terminal 1c, or more likely following an unsuccessful attempt to initiate a WAP session as set out in the preceding paragraph. In either case, an application in the sending terminal 1a extracts the textual content from each card of the deck 65 and pastes it into one or more SMS text messages for transport according to the bearer selected by the sender. Thus, the content may be transported as an SMS over the network via the SMSC or directly between the terminals 1a,1c using IR or LPRF. The SMS text message(s), once received by the receiving terminal, may be viewed in a conventional manner.

Turning now to the situation where the content is a URL, Figure 6 shows the format of a URLCard 80 as an SMS text message. The data for inclusion in the URLCard 80 is extracted from the corresponding Deck 65 and stored as a

title T 81 and web address or URL U 82. The URLCard 80 includes a header 83 which identifies the nature of the URLCard 80 to an application on the receiving terminal 1b

In use, the URLCard 80 is generated from the Deck 65 as described in the preceding paragraph using an application in the sender's terminal 1a. The push mechanism described above in relation to the Deck 65 as content is used to transport the URLCard to the receiving terminal 1b. Thus, the Card80 may be transmitted as an SMS text message via a conventional Short Message Service Centre (SMSC) which routes the URLCard 80 to the terminal 1b identified as the recipient. Alternatively, where the sender and receiver are in close proximity the URLCard 80 may instead be transferred directly between the terminals using IR or LPRF as selected by the sender. As illustrated in Figure7, following receipt by the recipient terminal 1b, the URLCard 80 it is identified by the application resident in the terminal 1b as being in the form of an SMS text message 90. The application then recognises the header 83 and determines that the URLCard contains a URL. Subsequently, the Title 81 and URL 82 are extracted by the terminal and when selected by the recipient this data is displayed 91 together with a legend next to the suitably programmed softkey 8 the depression of which softkey 8 causes the browser to be launched 92 and connection to the URL attempted.

In the event that the receiving terminal 1c is not WAP enabled, the sender may elect to send the content via the standard SMS text message route. This method may be selected by the sender initially where he knows that the recipient does not have a WAP enabled terminal or more likely following an unsuccessful attempt to initiate a WAP session as has been described above in relation to the Deck 65 as content. In either case, an application in the sending terminal 1a extracts the URL and title from the relevant Deck 65 and pastes it into one or more SMS text messages for transport according to the bearer selected by the sender. Thus, the content may be transported as an SMS text message over the network or directly between the terminals using

IR or LPRF. The SMS, once received by the receiving terminal 1c, is viewed in a conventional manner. Clearly, where the receiving terminal 1c is not WAP enabled, it will not be possible to launch a browser to access the URL from the receiving terminal. In which case, although the URLCard 80 may be displayed as an SMS, no option will be given via the softkey to launch a (non-existent) browser.

In the case where the contents are the browser settings for a gateway necessary to access a specific service they are stored in an SMS text message format with an appropriate identifier in the header and through the WAPpush mechanism set out previously in relation to the Deck and URL content, the content is transmitted to the receiving terminal 1b. Different services may be accessed through one gateway via the same settings in the terminal. In the event that the receiving terminal 1c is not WAP enabled, the content will be rejected in the manner described (time out a sending terminal) above in relation to the other forms of content. Although the option of sending the content via the SMS route could be carried out there does not seem to be any practical benefit in sending such content to a non enabled terminal 1c. However, assuming the receiving terminal 1b is WAP enabled, an application resident on the receiving terminal 1b identifies that the content is a browser setting from the header of the SMS text message. The application then prompts the recipient, via the UI, to either discard the browser settings or to store them in the terminal for later use.

It will be understood that where reference is made in the foregoing to an application for processing the content for either transmission or reception, this lies within the abilities of those skilled in the art. It will further be appreciated that in the interest of minimising the complexity of a user interface, the decision on which bearer to use for the connection may be under software control. Figure 8 is illustrative of a variant of the transmission process described above in relation to Figure 5 in which the user simply selects the recipient of the resource information 100 from his phone book 101, for

example and under software control the sending terminal, as part of the negotiation process, identifies the most suitable bearer depending on the capability of each terminal. The user may be provided with the ability to select a preferred mode for the connection, i.e. the least expensive in which case the sending terminal might choose to send a URL to the receiving terminal rather than an entire web page which would require much greater resources. Furthermore, where the user wished to use a line of sight bearer such as IR then this would override the software selection process set out above. Figure 8b illustrates the steps involved in the reception 102 and decision making 103 by the user of the received settings information.